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## SIMULATING BEAM DEFLECTION AND CHANNEL FORMATION WITH F3D\*

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Recently, we have begun 3-D simulations of Peter Young's channel formation and beam deflection experiments carried out on the Janus facility[1,2]. Measurement of the phase of the incident laser beam and knowledge of the properties of the optical focussing system has enabled us to calculate the amplitude and phase of the laser electric field at any point in the interaction volume. This, rather than a model, is used in F3D **F3D**. The local plasma properties are obtained both from measurement and Lasnex simulations. The subsequent evolution is determined by F3D's nonlinear hydro and light propagation. We report results of these simulations, and compare to experimental results.

The development of a robust 3-D eulerian hydrodynamics package (**NH3**) has enabled us to simulation nonlinear laser-plasma interactions occurring with high laser intensities (above  $10^{16} \text{ W/cm}^2$ ). The specifics of **NH3** and some applications to beam deflection were reported last year [3,4].

By extending **F3D** to run on distributed memory MPP machines, we are now able to simulate larger volumes of plasma. We present an overview of the new algorithm, and results obtained using the new ASCI Blue Pacific machine at Livermore.

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- [2] P. E. Young, D. E. Hinkel, C. H. Still, R. L. Berger, K. G. Estabrook, J. H. Hammer, W. L. Kruer, and E. A. Williams, "Observations of laser beam deflection in transverse flow", APS Division of Plasma Physics Meeting, Denver CO, Nov. 1996.
- [3] C. H. Still, R. L. Berger, A. B. Langdon, L. V. Powers, E. A. Williams, P. E. Young, "Nonlinear laser filamentation simulation in 3D", APS Division of Plasma Physics Meeting, Denver CO, Nov. 1996.
- [4] D. E. Hinkel, C. H. Still, R. L. Berger, A. B. Langdon, E. A. Williams, "Backscatter, filamentation and laser light smoothing in flowing plasmas", APS Division of Plasma Physics Meeting, Denver CO, Nov. 1996.

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